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[54] **APPARATUS FOR IMPRINTING SELECTED CHARACTERS ON A MOVABLE RECORD MEDIUM**

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[51] **Int. Cl.²** **B41J 11/18**

[58] **Field of Search** ..... 101/93.14, 93.21, 93.22, 101/93.37, 93.38–93.42, 110, 95, 99, 45; 235/60 P, 58 P

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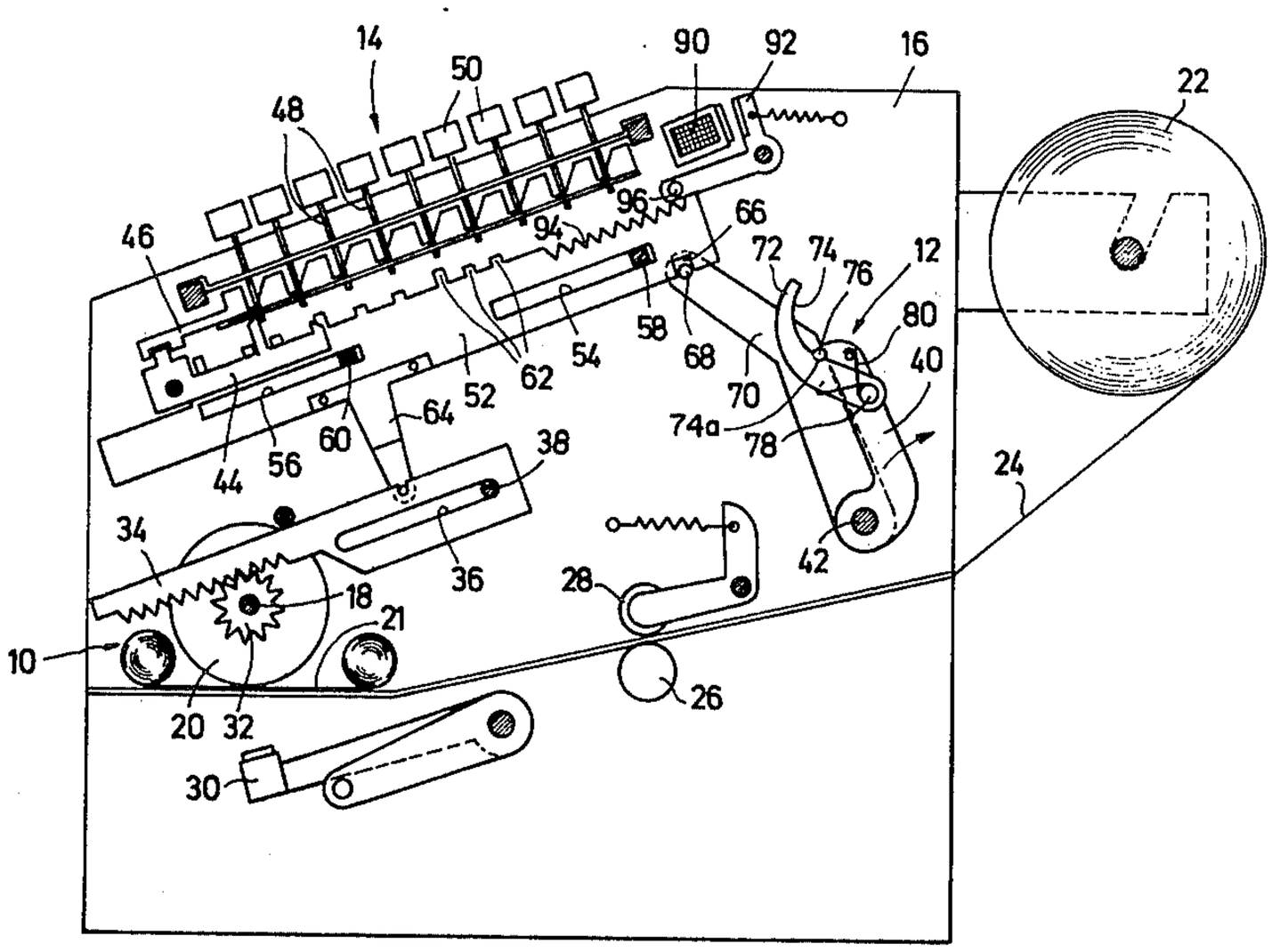
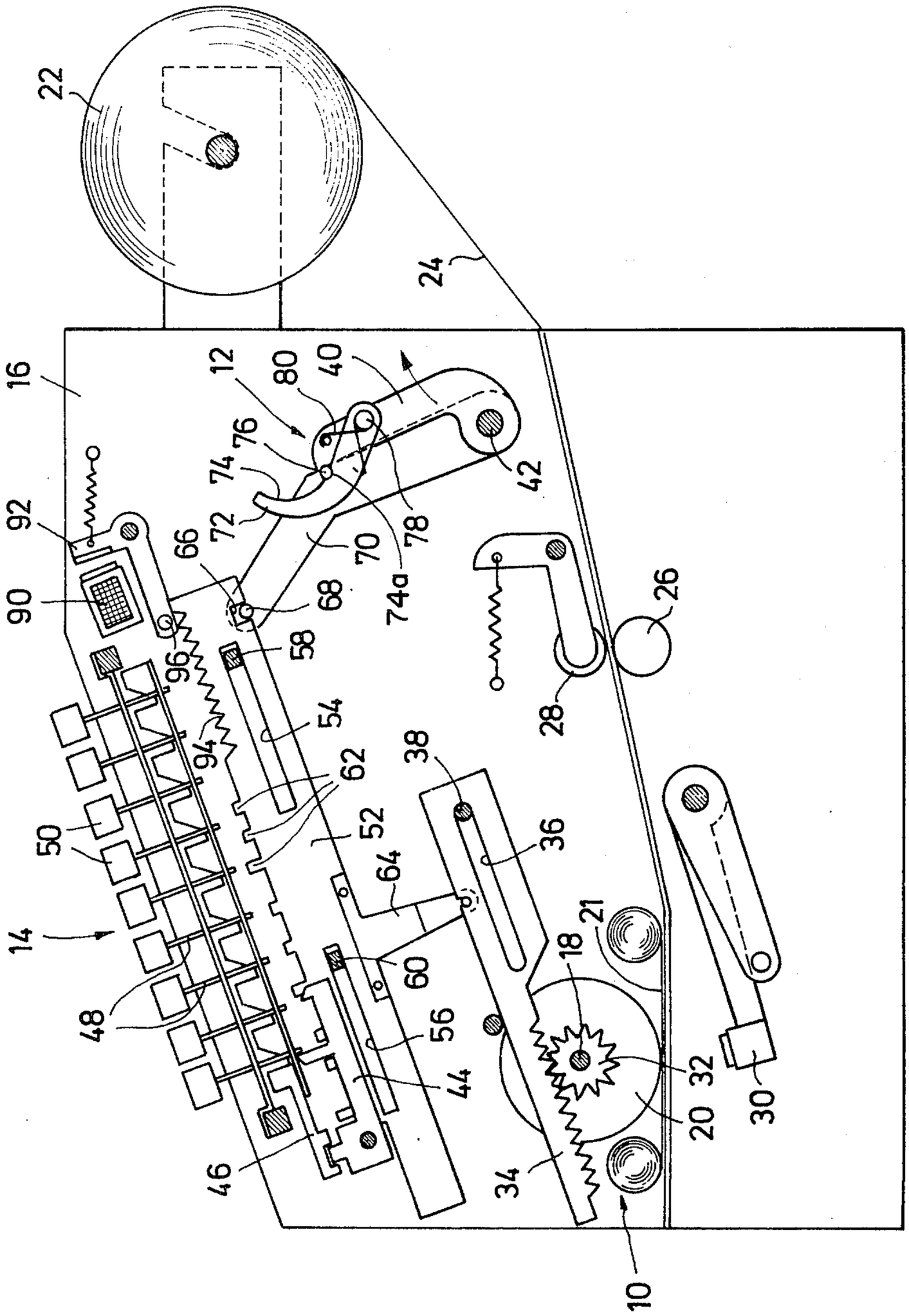
[57] **ABSTRACT**

A printing device for imprinting selected characters from a plurality of type wheels on a record medium is described. Control means are provided for selectively adjusting each of the type wheels to bring selected characters of each of said type wheels into registry with printing positions on the record medium. The control means includes adjusting means for each of said type wheels which are conjointly driven by a common drive means. Means are provided for inhibiting the operation of selected adjusting means when the associated type wheels have reached the selected printing position. Elastic coupling means are provided between the drive means and each adjusting means to permit the continued movement of said drive means independently of an inhibited condition of one or more of said adjusting means. Means are further provided for storing information to program the operation of the control means.

5 Claims, 1 Drawing Figure

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APPARATUS FOR IMPRINTING SELECTED CHARACTERS ON A MOVABLE RECORD MEDIUM

The present invention relates to a printing apparatus for imprinting selected characters on a movable record medium. More specifically the present invention relates to a printing mechanism having a set of juxtaposed type wheels with a plurality of characters thereon and control means for selectively adjusting said type wheels to bring selected characters thereon into registry with printing positions on the record medium.

Imprinting devices of this general type are already known in the art. However, in these prior art constructions, the setting or adjustment of the type wheels is effected directly by means of a setting device once the information to be printed has been fed thereinto. Such a setting of the type wheels generally can be accomplished with an expensive control mechanism.

It is the object of the present invention to structurally simplify imprinting devices of this type and category and to provide them in such a manner that the setting of all of the type wheels takes place simultaneously and independently of the input or feed of the information into the setting device.

This object of the present invention is fulfilled by virtue of the fact that the information which determines the selective adjustment of the type wheels to be fed into the control device is adapted to be stored therein; that the setting members of the control device are displaceable by means of a drive member which, during each setting operation, passes through a predetermined maximum adjusting path; and that the setting movement of these setting members by the setting device corresponding to the stored information can be interrupted, independently of the movement of the drive member, when the type wheels assume a position in which the symbol or character value that corresponds to the information fed into the control device is in the printing position.

In a preferred embodiment the setting means include toothed racks which mesh with a toothed pinion coupled to the type wheels. The length of the adjusting path of the toothed racks is adjustable by means of stop means which are selectively actuated by the control device. The drive member traverses a predetermined maximum path corresponding to the maximal angle of rotation of the type wheels for any selected combination of adjustment of the type wheels and is elastically coupled with a setting member serving for the drive of the toothed racks.

In a preferred embodiment the drive member and the setting members comprise first and second pivotable levers, respectively. The first pivotable lever is rigidly affixed to a pivot shaft while the second pivotable lever is freely rotatably positioned thereon. An elastic driving connection is provided between these two pivotable levers. In a preferred embodiment, one of the pivotable levers has a pivotable engaging lever secured thereto which is rotatable on an axis parallel to the axis of the pivotable shaft and which, with a concavely curved edge, engages behind a lateral shoulder or extension of the other pivotable lever. Coupled to this engaging lever is a spring which seeks, by means of the engaging lever, to hold the pivotable lever serving as setting member against the pivotable lever serving as a drive member.

The control device for storing information relating to the characters to be selected on the type wheels may comprise a bank of keys equipped with a zero lever slide. The keys are provided with spars which serve as stop means which selectively engage and limit the travel of the toothed racks. In this case, each toothed rack is advantageously secured to a connecting rod each of which is operatively associated with one row of keys and in operative engagement with the key spars constituting the stops. The connecting rod is coupled to and displaceable by means of the pivotable lever forming the setting member in the plane of the associated row of keys.

The present invention will now be further described hereinafter with reference to the accompanying drawing the single figure of which is a longitudinal cross-sectional view through one embodiment of the printing device of the present invention.

With the aid of the printing device as disclosed and described herein it is possible to print on a movable record medium, particularly labels, selected characters. It is particularly suitable for providing price or content data on labels for making merchandise.

The printing device of the present invention comprises a printing mechanism generally identified **10,** a drive mechanism generally identified **12,** and a setting device generally identified **14** for setting the symbol or character values that are to be printed on a data carrier by means of the printing mechanism **10.** These mechanisms **10, 12, 14** are supported and disposed between a pair of parallel support plates **16.**

The printing mechanism **10** includes a plurality of type wheels **20** which are rotatably disposed with a small spacing on a common bearing axle **18** journaled in side support plates **16.** The type wheels have a plurality of characters disposed around the circumference thereof at a uniform angular spacings. These characters may comprise numbers or any alpha-numeric symbols.

Let it be assumed that, in a preferred embodiment, it is intended to print with the aid of the printing mechanism **10** price data on individual labels for the purpose of marking merchandise. For this purpose, there is guided below the type wheels **20** an ink ribbon **21** with which a web of paper **24** carrying individual labels can be drawn off of a spool **22.** The web of paper **24** is gradually pulled into the device by means of a draw-off roller **26** to which a counter roller **28** is coupled. The paper is moved past the type wheels **20,** whereby an unprinted label is brought into registry with type wheels **20.** Reference numeral **30** identifies a printing hammer which is operatively associated with type wheels **20** and which executes a striking movement in a manner for pressing the label against ink ribbon **21** and the selected characters on type wheels **20.**

For purposes of adjusting the type wheels, a set wheel **32,** provided as a gear wheel, is coupled to each type wheel **20.** These set wheels **32** are positioned on one end face of the type wheels **20** and are in form-locking engagement with a toothed rack **34** bringing about the adjusting movement. The toothed racks **34** coupled to the type wheels **20** are movable in rectilinear paths. Elongated slots **36** are provided in toothed racks **34** for receiving guide rods **38** which are rigidly affixed between side plates **16.**

For displacing the toothed racks for adjusting the type wheels **20** a driving or actuating lever **40** is provided which is disposed on a pivot shaft **42** so as to be rigid against rotation. Pivot shaft **42** is rotated by means

of a suitable drive means. For each adjusting operation, i.e. for each new setting or adjustment of the type wheels **20,** pivot shaft **42** is rotated in the direction indicated by arrows about a given angle such that the toothed racks **34** are conjointly displaced by the drive lever **40.** The length of the adjusting path of the toothed racks **34** is determined by the setting device **14** corresponding to the information that is stored therein, independently of the pivoting movement of the drive lever **40.** The setting device **14** preferably includes a bank of keys which is equipped with a zero return lever slide **46** controlling a zero return lever **44,** and in each case one row of keys corresponding for example to a number of digits of a figure to be printed is associated with each type wheel **20.** A connecting rod **52** is provided which is displaceably guided by means of elongated slots **54, 56** on stationary guide rods **58, 60** secured in side plates **16.** Connecting rod **52** comprises on the long side thereof facing the row of keys one stop projection **62** per key spar **48** of individual keys **50.** As shown in the drawing, the stop projections **62** and/or the key spars **48** have configurations such that each key spar corresponds with a different projection, respectively, whereupon actuation of a given key results in connecting rod **52** shifting to the right to a position in which the corresponding stop projection **62** engages the spar of the actuated key, the type wheel **20** having been rotated through an angle causing the appropriate character thereon to be adjacent the printing medium **24.** Secured to each connecting rod **52** by means of a connecting arm **64** is one of the toothed racks **34.** A bolt **68** of a setting lever **70** which is pivotally disposed on the pivot shaft **42** engages in recess **66** in connecting rod **52.** This setting lever **70** is resiliently coupled with the driving lever **40** in such a manner that the driving lever **40** is then adapted to drive the individual setting levers **70.** Accordingly, setting levers **70** can displace by means of connecting rods **52** the toothed racks **34** about a niaximal adjusting path when no key is depressed. In order to insure that the displacing movement of the connecting rods can be interrupted independently of the pivoting movement of the driving lever **40** when the type wheels assume a position in which the number that corresponds to the information being locked in the setting device is in printing position, an engaging lever **72** positioned on an axis parallel with respect to the pivot shaft **42** is hingedly connected for example with the driving lever **40.** Engaging lever **72** hooks or engages with concavely curved edge **74** thereof behind a lateral stop pin **76** extending from setting lever **70.** Disposed on the pivot axle **78** of the engaging lever **72** is a torsion spring **80** which seeks by means of the engaging lever **72** to pivot the setting lever **70** into a position parallel to and against the driving lever **40.** The curved surface **74** contains a recess **74a** that receives the stop pin **76** when the levers **40** and **70** are in their illustrated normal adjacent positions.

The key return spring means (not shown) and the zero slide and zero lever means for returning the keys to their illustrated retracted positions when the connecting rod **52** is returned to the illustrated position form no part of the instant invention, and consequently will not be further described.

The printing device described hereinabove operates as follows:

After each printing operation, the driving lever **40** corresponding to each row of keys, the setting lever **70** with connecting rod **52,** toothed rack **34** and the type

wheel **20** are returned into the starting position indicated in the drawing. In that position, all of the type wheels are in the same position, i.e. that same character, in the present case the number **0,** is in printing position. In order to make labels on which a specific price information or indication is imprinted, it is necessary to initially feed a corresponding information to the setting device **14,** by tapping a specific numerical value in the bank of keys. By virtue of this tapping of keys, the setting movement required for the setting of the type wheels **20,** of the toothed racks **34** and of the connecting rods **52** is established in the setting device **14,** in that the spars **48** of the depressed keys **50** serves as stop means for the connecting rod **52** corresponding to the respective rows of keys. When the numerical value corresponding to the price to be printed has been tapped in, the setting operation or procedure for setting the type wheels **20** is initiated by means of a starter key not further illustrated herein. The driving lever **40** is pivoted by the pivot shaft **42** in the direction shown by arrows about a predetermined angle. By way of the engaging lever **72,** the setting levers **70** being connected in each case with a connecting rod **52** are conjointly pivoted at that time so that the connecting rods **52** and the toothed racks **34** will be set in motion in the longitudinal direction. This setting movement of elements **34, 52, 70** takes place or continues until the stop projection **62** of the individual connecting rods which corresponds to the spar of the depressed key strikes against the spar **48.** Due to this driving of the connecting rods **52** along the corresponding key spars **48,** there occurs an interruption in the drive of the rods **34, 52,** and at that time, the type wheels that have been brought to a standstill thereby will assume a printing position wherein the number which is tapped into the row of keys is in registry with the label strip **24.** During one setting operation, the respective connecting rods **52** and the associated toothed racks **34** will thus execute different setting movements corresponding to the respective numbers tapped into the various rows of keys. However, the driving lever **40** is pivoted about a predetermined angle which is at least as great as the angle of rotation necessary for the number having the highest value on the type wheels to arrive in a printing position. This means that in the course of one setting operation, as soon as the connecting rods **52** cooperate with the spar **48** of the respectively depressed key of the corresponding row of keys, the setting lever **70** comes to a standstill and the driving lever **40** executes a relative movement with respect thereto. Therefore, the setting movement of the toothed racks **34** is interrupted by the setting device **14** corresponding to the tapped-in information, independently of the movement of the driving lever **40.** When the type wheels **20** have been set, the printing hammer **30** becomes operative and presses the label against type wheels **20** for a short period of time, whereupon the draw-off roller **26** puts the paper strip into motion in order to place a new label in printing position. This draw-off roller is preferably driven by way of an electromagnetic coupling, and the circuit may be controlled by a photoelectric cell.

The imprinting device may further be equipped with a preselection counter so that, after the completed setting of the type wheels by the device, a plurality of duplicate labels may be printed until the number of labels having been set or chosen by the preselection counter has been reached. Upon the completion of the printing operation, the rocking shaft **42** returns the

driving lever **40** to the starting position thereof, whereupon by way of the setting levers **70** all of the connecting rods **52,** toothed racks **34,** and all of the type wheels are once again placed in the starting position. At the same time, the depressed keys are unlocked in a manner known per se so that a new setting of the imprinting device is made possible.

In order to allow for controlling the printing device electrically, as an alternative to the mechanical key board, each connecting rod may be operatively associated with an annular toggle lever **92** adapted to be controlled by an electromagnet **90.** The connecting rods **52** may be equipped at the long side thereof with notched recesses **94** the number of said recesses corresponding to the number of characters existing on each of the type wheels **20.** With a notch bolt **96,** the toggle lever **92** may in this case engage or lock in the notches when the magnet **90,** in the course of a selected operation, is controlled at a specific period of time by a setting device. This control or operation takes place in such a manner that the rocking lever **92** will engage in the respective notch recess **94** which corresponds to the selected character of the corresponding type wheel that happens to be in printing position at that time. Thus it is thereby possible to control the imprinting device for example through the digital unit of an electric cash register in order to imprint with its aid cash vouchers, vouchers or coupons or check stubs. An imprinting device conceived in this manner may equally be connected to process counters or serve as imprinting or marking devices for labels etc. on electronic scales and the like.

The apparatus of the present invention may be modified as would occur to one of ordinary skill in the art without departing from the spirit and scope of the present invention.

It is claimed:

1. In a printing apparatus for printing characters on a printing medium, including a plurality of rotatable type wheels (**20**) each having a plurality of characters on the periphery thereof, drive means normally rotating said wheels through operating angles causing all of the characters thereon to be successively arranged in printing positions relative to said printing medium, and keyboard means for interrupting the rotation of the type wheels to positions in which selected characters thereon are in printing positions, respectively, relative to said printing medium; the improvement wherein said drive means comprises

a. common drive lever means including a plurality of pivotable drive levers (**40**) associated with said type wheels, respectively, and means (**42**) for simultaneously pivoting said drive levers between first and second positions, respectively; and

b. means connecting each of said type wheels with its associated drive lever, respectively, comprising

1. a toothed set wheel (**32**) coupled with the associated type wheel;
2. a longitudinally slidable rack (**34**) having teeth that engage the teeth of said set wheel;
3. a setting lever (**70**) pivotable at one end about an axis parallel with the pivot axis of said drive lever;
4. connecting rod means (**52**) associated with said keyboard means for connecting the other end of said setting lever with said rack; and
5. means (**72,80**) resiliently connecting said setting lever with said drive lever, said connecting means being normally operable, upon pivotal movement of said drive lever from said first position to said second position, to rotate the associated type wheel through the aforementioned operating angle, whereby when all of the drive levers are pivoted from their first positions toward their second positions, displacement of said connecting rod means may be interrupted by said keyboard means at positions causing desired characters on said type wheels to be in printing positions, respectively, relative to said printing medium.

2. Apparatus as defined in claim **1,** wherein said resilient connecting means includes an engaging lever (**72**) pivotally connected with one of said drive and setting levers, said engaging lever having a concavely curved surface, the other of said drive and setting levers having a lateral extension engageable with said curved surface, and spring means (**80**) normally biasing said engaging lever to bias said setting and drive levers together.

3. Apparatus as defined in claim **2,** wherein said lateral extension comprises a pin which engages a notched recess contained in said concave curved surface of said engaging lever when said setting and drive levers are held together.

4. The apparatus of claim **1,** wherein there is further provided electrically actuable means for engaging and stopping said connecting rod in selected positions.

5. The apparatus of claim **4** wherein said electrically actuatable means includes an electromagnetically actuated toggle lever which operatively engages and stops said connecting rod in selected positions in response to electrical command signals.

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